

# **EXHIBIT 1**

# **Lower Fox River and Green Bay PCB Fate and Transport Model Evaluation**

## **Technical Memorandum 2d**

### **Compilation and Estimation of Historical Discharges of Total Suspended Solids and Polychlorinated Biphenyls from Lower Fox River Point Sources**

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**Wisconsin Department of Natural Resources**

## 1.0 Executive Summary

This technical memorandum is provided in partial fulfillment of the Model Evaluation Work Plan developed under the Memorandum of Agreement between the State of Wisconsin and the Fox River Group (FRG) of Companies dated January 31, 1997. The companies include P.H. Glatfelter Company, Wisconsin Tissue, Riverside Paper, Appleton Papers, NCR Corporation, U.S. Paper Mills and Fort James Corporation.

Task 2d of the Model Evaluation Workplan calls for development of solids and polychlorinated biphenyl (PCB) loads from all significant point sources that may have contributed solids and PCBs to the Lower Fox River from the mid-1950s to 1997. This report documents the historical data discovered in this process, reports the findings and methods used to calculate loads, and presents the load estimates. These estimates are intended as input for a PCB transport and fate model hindcast simulation that begins at a time prior to significant discharge of PCB to the Lower Fox River.

Nearly all PCB discharges to the Lower Fox River are believed to have resulted from the production and recycle of NCR carbonless copy paper (NCR Paper) made with coating emulsions that contained PCBs. Three pathways of release to the river were identified relevant to PCBs used in the production of NCR Paper. These pathways are: 1) **PRODUCTION** releases of PCBs during the manufacturing process (primarily at the Appleton Papers - Appleton Coated Papers Mill); 2) **BROKE and CONVERTER TRIM** deinking of NCR Paper broke derived from manufacturing and converting processes and sold to deinking mills in the Fox Valley and elsewhere; and 3) **WASTEPAPER/SECONDARY FIBER** recycling which includes post-consumer paper sources that contain some NCR Paper forms or use of secondary fiber sources that contain detectable PCB levels. These three pathways were investigated to determine the total PCB discharge and annual load for each facility that carried out any of the three types of activity during the period of 1954 to 1997.

The estimated cumulative PCB release from all sources was 313,600 kg (based on 3% production loss and 25% partitioning). The release due to NCR Paper production was 122,450 kg and is 39% of the total. The release due to NCR Paper broke and converter trim use was 176,450 kg and is 56% of the total. The release due to waste paper/secondary fiber recycling was 14,700 kg and is 5% of the total discharge.

Two primary factors control the magnitude of calculated PCB discharges. These factors are the rate of PCB loss during coating operation in the production of NCR Paper and the partitioning of PCBs to product during deinking. The production loss rate impacts the mills that produced NCR Paper. Production loss rates vary from 1% to 5%. As a result, discharge estimates due to production vary from 40,000 kg to 208,300 kg. Under any set of assumptions, the amount discharged during production is a significant portion of the total release. The partitioning of PCBs to product fiber impacts the mills that used NCR Paper broke and converter trim. This factor also influences facilities that recycle secondary fiber sources such as wastepaper. Partitioning factors are believed to range from 25% to 75%. A wider range for this parameter may be possible. As a result, the discharge estimates due to broke and converter trim use vary from 176,450 kg to 71,750 kg (higher partitioning factors result in lower overall discharges). Under any set of assumptions, the total amount discharged during broke and converter trim use is a significant portion of the total discharge. Total PCB discharges attributable to wastepaper/secondary fiber are small in comparison to other release pathways and range from 4% to 12% of the overall PCB release. Cumulative PCB releases from all pathways are 399,450 kg if the PCB loss during production of NCR Paper was 5% and 25% of PCBs in broke and trim PCB partition to product. Cumulative PCB releases are 126,450 kg if the PCB loss during production of NCR Paper was 1% and 75% of PCBs in broke and trim partition to product. Waste paper recycle resulted in the least amount of PCB discharge of all three pathways (14,700 kg).

Over 98% of the cumulative PCB load was discharged by the end of 1971. Five facilities account for more than 99% of the PCBs discharged to the river. These include the Appleton Papers-Coating Mill (38%), the P.H. Glatfelter Company and associated Arrowhead Landfill (27%), Fort James-Green Bay West Mill (23%), and Wisconsin Tissue (10%), and Appleton Papers-Locks Mill (2%). Discharges from all other facilities are less than 1% of the total PCB release.